Introduction

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Introduction

What we do

- Support department research
- Build servers and clusters
- Manage infrastructure
- Helpdesk support

How to get in touch

Contact us via
cshelpdesk@virginia.edu

Find more information
https://cs.virginia.edu/wiki
Introduction

What we don’t do

- Email accounts
- Mailing lists
- Netbadge

Who Does?

ITS
4help@virginia.edu

Find more information
https://its.virginia.edu/helpdesk
Introduction

What else we don’t do

- Phones
- Department mailing lists
- Environment requests (AC, heating, etc.)
- Facilities requests
- Room (swipe) access

Who Does?

CS Office Staff

cs-office@virginia.edu
Introduction

Help Desk Tickets

- Email sent to cshelpdesk@virginia.edu will generate support ticket
- Should receive auto-response and ticket number in the subject line
- Tickets help us track support requests
- Reply to original email thread
- Don’t modify subject line
Accounts
Accounts

CS Account

- Different from ITS/NetBadge account
- Allows login to department resources
- User accounts come with file storage
- Web hosting space associated with account
Accounts

CS Account

You will receive an email with subject:

UVA Computer Science Account Info

From cshelpdesk@virginia.edu containing your account information

Password is temporary, you will be asked to change it at first login
Accounts

CS Domain

- One password for everything CS
  - No longer separate passwords for Windows vs. Linux
- Account and file storage will expire when you leave
- Files owned by expired accounts will not be kept
Accounts

**Password Change**

Users can change their password during active session (Linux/Windows)

**Password Reset**

*New* Users are able to reset their CS password online

[https://www.cs.virginia.edu/PasswordReset](https://www.cs.virginia.edu/PasswordReset)
Network
Network

- CS has its own network apart from ITS
- Layer 2 network
- 1Gb/s connection at each desk
- Growing 10Gb/s network
- Public IP addresses
  - CS has 6 class C subnets
Network

- Network clients must be registered
- Clients can be registered by request
- CS has no wireless network
  - Wireless clients should connect to ITS WiFi
- Unauthorized clients will be found and blocked **without notice**
Network

DHCP

- Clients must register device MAC Address
- Requests for new devices must come from faculty
Network

DNS

- Authority for cs.virginia.edu domain space
- Hosts are in cs zone
  - A computer/server named power2 has FQDN power2.cs.virginia.edu
- Names and aliases may be requested by faculty
Network

- ITS blocks certain types of traffic
  - Samba
  - Windows Remote Desktop
- ITS watches network traffic looking for
  - Botnets
  - Malware activity
  - Torrents
  - Spam
- Flagged traffic can result in Abuse Ticket
- *New firewall in CS*
Network

Absolutely no wireless access points!
Network

SSH access now blocked from outside of UVA

If you are outside of the university, you can:

- Use VPN client - access servers directly using VPN
- SSH to `portal.cs.virginia.edu`

Port 22 is open on `portal.cs.virginia.edu`
Network

SSH Jumphost Option

[ktm5j@outside-uva ~]$ ssh -l ${userid} ${destination} -J portal.cs.virginia.edu

[ktm5j@outside-uva ~]$ ssh -l ktm5j power3 -J portal.cs.virginia.edu
ktm5j@portal04.cs.virginia.edu's password:
ktm5j@power3's password:
ktm5j@power3 ~ $ <- Logged into power3
Operating Systems
Operating Systems

- All major operating systems found in CS
- Official support for
  - CentOS 7.6
  - Ubuntu 18.04
  - Windows 7, 10
  - Mac OS X
- Desktop systems come dual-boot Windows/Linux
Linux

- Main research platform
- CentOS on server systems
- Ubuntu on desktop systems
Linux

Software

- Common software available as *Modules*
- Smaller packages (libraries, dependencies, etc) installed through OS packages
Linux

Modules

- Modules allow multiple versions of same software to co-exist without affecting each other
- Software is located in /sw
- Mounted over NFS & available everywhere
Linux - Modules

View software with `module avail`

Load a module with `module load`

```
$ module avail

------------------------ /sw/centos/Modules/modulefiles ------------------------
altera_pro        cudnn-7.0.5    java9    php7.1.10
anaconda3         cudnn-7.1.1    java9.0.4 python
atom               doxygen        lua      python3
boost              eclipse        lua-5.3.4 python3.6.2
boost-1.67.0       emacs          matlab   qsys
clang-11vm         fio            modelsim_ae quartus
clang-11vm-6.0.0   gcc            modelsim_ase ruby
clang-11vm-6.1.0   gcc-6.3.0      nios2eds ruby2.5.1
clang-11vm-7.0.0   gcc-7.1.0      perl1    storm
clang-11vm-8.0.0   gdb-8.1        perl1-5.26 vscode
clang-11vm-8.1.0   java           perl1-6
clang-11vm-9.0.0   java8          perl
clang-11vm-9.1.0   java8u161      php
clang-11vm-9.2.0   java8u264      php7

------------------------ /sw/linux-any/Modules/modulefiles ------------------------
apktool  tmux  tmux-2.7
$ module load java9
$ which java
/sw/centos/java/9.0.4/bin/java
$  
```
Windows

- Desktop systems come with Windows 7 or Windows 10
- Systems joined to CSDOM domain
- Users can be added to local admin group once they return signed policy agreement
- Windows 10 systems use Windows Defender
Mac OS

- Mac systems are ad-hoc
- Not joined to domain
- Not set up for NFS
- Can use samba to mount home directory
- Use samba to print
File Storage
File Servers - SAN Configuration
File Storage

- 8Gb/s SAN network
- ~1PB of disk space in CS
- All partitions now ZFS
- Snapshots every 6 h
- Off-site backups
File Servers - Ethernet connected to off-site backup location
File Servers - Storage configuration mirrored at backup site
File Storage

ZFS

- Dynamic partitions
  - Storage can be hot-added or removed
  - Partitions can be moved easily
- Snapshots
  - Exact copy of partition
  - Window into past
  - Easy to interact with
File Storage

Home Directories

- Network storage mounted on all Linux systems
  - Home directory available everywhere
  - Mounted in /
- Historically home directories organized by partition
- Partitions are associated with faculty member
- Old partitions named zf1–zf25
- Very old partitions named af* or uf*
File Storage

Network Access

- Department computers pre-configured
- Linux systems have all partitions mounted via NFS
- Windows desktop systems mount home directory to K:\ drive
- NFS restricted to UVA networks & authorized clients

Personal Devices & Outside CS

- Samba/CIFS can be used
- Must be inside UVA network or on VPN
File Storage

Samba/CIFS

We have a new central samba server:

\samba.cs.virginia.edu\username

- One address for everyone
- Authenticate with CS credentials
File Storage

New Storage - /u and /p

- Additional 300TB added to SAN
- New /u and /p partitions
  - /u - user home directories
  - /p - project directories
File Storage

/u - Home Directories
- New accounts
- Each home directory as its own ZFS dataset
- 20GB quota

/p - Project Directories
- Project space
- Better place for data
- Group owned
- Can be tweaked for performance
File Storage

/bigtemp

- Large 70TB volume
- Used for storing large datasets
- Scratch space
- Not backed up
- Files may be deleted after period of time
File Storage

Backups and Snapshots

- Snapshots taken every 12 hours (2x per day)
- Snapshots immediately transferred to off-site
- Typically kept for 30 days

Snapshot Quirks

- Because of snapshots, deleting files does not recover space
- Space only recovered once snapshot eventually deleted
- Full ZFS datasets will require admin intervention
Web Server
Web Server

- Every account gets web space under www.cs.virginia.edu domain
- Server runs PHP
  - With DB connectors
- DB accounts are requestable
Web Server

Content for each user-site is found in home directory

~/public_html/

URL format

https://www.cs.virginia.edu/~username
Web Server

Content for each user-site is found in their home directory

~/public_html/
Department Resources

Printing

- Printing available at no cost
- Two print servers
  - Windows print server
  - CUPS Unix print server
- Poster printing available
Department Resources

Poster Printing

- Poster printing available upon request
- Request for poster printing must be sent to cshelpdesk@virginia.edu
- Poster requests must be submitted with 48 hours notice
Department Resources

Loaner Laptops

Lenovo loaner laptops are available for students

- Request must be made by faculty
- Short term, typically 2 weeks or less
- Period can be extended with approval
Department Resources

CS Office

The following requests are handled by admin staff and should be sent to cs-office@virginia.edu

- CS department mailing lists (cs-faculty, cs-grads etc.)
- Room (swipe) access
- Conference room scheduling
Computing Resources
Computing Resources

- Many clusters in CS
- SLURM used for *scheduler*
- GPUs
- FPGAs
- Infiniband
Computing Resources

SLURM (Simple Linux Utility for Resource Management)

- Workload manager for 60% of TOP500 clusters
- Allocates resources to clients
- Jobs can be submitted from power nodes (power[1-6])

```
ktm5j@power3 ~ $ srun -w slurm[1-5] hostname
slurm3.cs.virginia.edu
slurm1.cs.virginia.edu
slurm5.cs.virginia.edu
slurm2.cs.virginia.edu
slurm4.cs.virginia.edu
ktm5j@power3 ~ $
```
## SLURM Nodes

<table>
<thead>
<tr>
<th>Hostname</th>
<th>Count</th>
<th>GPUs</th>
<th>Memory (GB)</th>
<th>CPU Type</th>
<th>CPUs</th>
<th>Sockets</th>
<th>Cores/Socket</th>
<th>Threads/Core</th>
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</thead>
<tbody>
<tr>
<td>hermes[1-4]</td>
<td>4</td>
<td>256</td>
<td>AMD</td>
<td>64</td>
<td>4</td>
<td>8</td>
<td>2</td>
<td></td>
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<tr>
<td>artemis[1-7]</td>
<td>7</td>
<td>1</td>
<td>128</td>
<td>AMD</td>
<td>32</td>
<td>2</td>
<td>8</td>
<td>2</td>
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<tr>
<td>slurm[1-5]</td>
<td>5</td>
<td>512</td>
<td>Intel</td>
<td>24</td>
<td>1</td>
<td>12</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>falcon[1-10]</td>
<td>10</td>
<td>128</td>
<td>Intel</td>
<td>24</td>
<td>1</td>
<td>12</td>
<td>2</td>
<td></td>
</tr>
<tr>
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<td>64</td>
<td>Intel</td>
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<td>1</td>
<td>10</td>
<td>2</td>
<td></td>
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<tr>
<td>trillian[1-3]</td>
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<td>256</td>
<td>AMD</td>
<td>64</td>
<td>4</td>
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<td>granger[1-6]</td>
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<td>64</td>
<td>Intel</td>
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<td>10</td>
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<td>64</td>
<td>Intel</td>
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<td>4</td>
<td>2</td>
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<td>4</td>
<td>64</td>
<td>Intel</td>
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<tr>
<td>lynx[01-12]</td>
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<td>4</td>
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<td>8</td>
<td>2</td>
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<tr>
<td>affogato[01-15]</td>
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<td>128</td>
<td>Intel</td>
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<td>8</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
## gpusrv Nodes

<table>
<thead>
<tr>
<th>Hostname</th>
<th>GPUs</th>
<th>Memory (GB)</th>
<th>CPU Type</th>
<th>CPUs</th>
<th>Sockets</th>
<th>Cores/Socket</th>
<th>Threads/Core</th>
</tr>
</thead>
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<tr>
<td>gpusrv02</td>
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<td>2</td>
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<td>gpusrv03</td>
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<td>64</td>
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</tr>
<tr>
<td>gpusrv04</td>
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<td>64</td>
<td>Intel</td>
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<td>1</td>
<td>6</td>
<td>2</td>
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<tr>
<td>gpusrv05</td>
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<td>2</td>
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<tr>
<td>gpusrv06</td>
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<td>64</td>
<td>Intel</td>
<td>8</td>
<td>1</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>
Computing Resources

SLURM Nodes
- >2000 cores in SLURM
- Almost 10TB Memory
- 50 GPUs

Gpusrv Nodes
- 64 cores
- 352 GB Memory
- 12 GPUs

Power Nodes
- power[1-6]
- 96 cores
- 576 GB Memory
Takeaways
Takeaways

- CS vs. ITS
- Lots of computing power
- Lots of storage
- Be mindful
- cshelpdesk@virginia.edu